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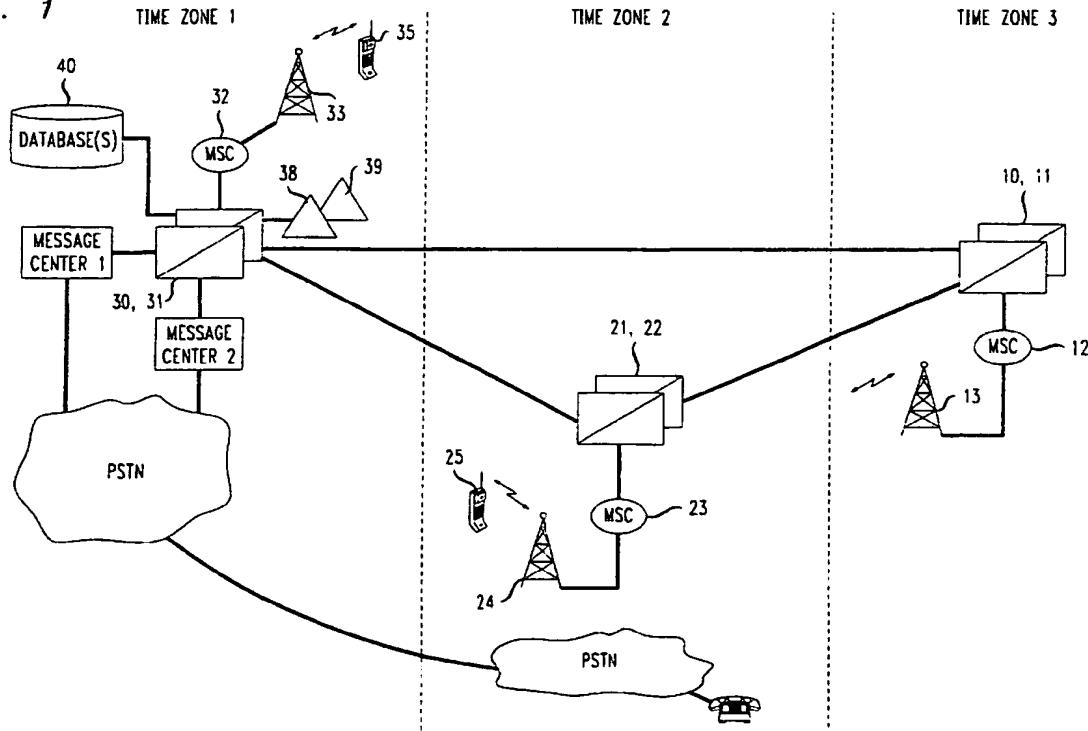
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(54) A method for time-stamping a message based on a recipient location

(57) A method time-stamps an electronic message
in accordance with information about the time zone in

which the intended recipient resides where the message
is originally received by a message center in a time zone
different from the intended recipient.

FIG. 1



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Description**BACKGROUND OF THE INVENTION**

The present invention is directed to a method for time-stamping a message based on the location of the message recipient. More particularly, the present invention is directed to a method for determining the location of an intended message recipient and adjusting a received time-stamp to reflect a time associated with the location at which the intended recipient is located.

It is known to provide message services in communication systems. An example of one such message service is referred to as the short message service (SMS) available on the PCS cellular network operating under the IS-136 protocol (TIA/EIA/IS-136.1-A October, 1996 TIA/EIA/IS-136.2 October 1996). In such a network the cellular subscriber can receive data packets containing messages wherever the cellular subscriber is located. The IS-136 standard states that the message transmitted to the subscriber should include some time-stamp indicating when the message was received. However, there is no indication in the standard that the time-stamp should at all be correlated to the time zone where the cellular subscriber is located when he or she receives the message. The message could be time-stamped in accordance with the time zone in which the message is first received for distribution to the cellular subscriber. This could create confusion for the intended recipient when the message is sent out in relation to the present time for the subscriber. For instance, assume the message center is in one time zone, e.g., Pacific Standard, and the message is received at 1 p.m. in that time zone. Further assume that the cellular subscriber is in a second time zone, one hour ahead of the first time zone (Mountain Standard). Thus, the message was received at the message center at 2 p.m. Mountain time. If the message is delivered to the cellular subscriber at 2:15 p.m. in the second time zone but shows a message time-stamp of 1 p.m., reflecting the first time zone, then the cellular subscriber is confused as to when the message was actually received at the message center. It would be beneficial if this confusion could be avoided.

SUMMARY OF THE INVENTION

The present invention avoids the confusion that can arise when a message is received in a message center in a time zone different from that of the intended message recipient. In accordance with an embodiment of the present invention a message center receives and notes the time of receipt at the message center in accordance with the time zone in which the message center is located. The message center then determines the location of the intended message recipient. The message center determines the time zone of that location and translates the received time into the time zone of the intended recipient.

In an embodiment in the communications area a message center receives a message and a recipient identifier. The message center translates the identifier into a mobile identification number. The mobile identification number is then used to query a home location register to determine the location of the mobile switching center servicing the subscriber. Once the mobile switching center is determined, its location can be derived from a database. This location will have an associated time zone in which the mobile switching center is located. The time that the message center received the message will be translated to the time zone for the mobile switching center. As a result, the cellular subscriber using that switching center will receive an indication of the received time of the message in terms of the time zone corresponding to the location at which the subscriber is located.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates in block schematic form a configuration implementing an embodiment of the present invention.

FIG. 2 illustrates an embodiment of a database correlating message recipients and mobile stations.

FIG. 3 illustrates an embodiment of entries in a database correlating portions of mobile station identifiers and home location registers.

FIG. 4 illustrates an embodiment of entries in a database correlating the location of switches servicing cellular subscribers and the time zone of each switch.

FIG. 5 illustrates an embodiment of contents of a message transmitted from a message center to a subscriber in accordance with the present invention.

FIG. 6 provides a flow chart describing an embodiment of a method for time-stamping a message in accordance with the present invention.

DETAILED DESCRIPTION

FIG. 1 illustrates a schematic representation of a system in which the present invention could be implemented. In particular, FIG. 1 illustrates a representation of three time zones in which different portions of a wireless communication network can be located. In Time Zone 3 there are signal transfer points (STPs) 10 and 11. (A single transfer point could be provided, however, transfer points may be assigned in pairs to provide back-up.) A mobile switching center (MSC) 12 is coupled to the signal transfer points. A cell site 13 is coupled to the MSC. The cell site then communicates over-the-air with mobile stations in the cell covered by that cell site. STPs 21 and 22 are located in Time Zone 2 and are connected to MSC 23. MSC 23 is connected to cell site 24. In Time Zone 2, a wireless phone is shown as element 25. The cellular network further includes, in Time Zone 1, STPs 30 and 31 connected to MSC 32, which is in turn connected to cell site 33. That cell site can be in commun-

cation with a mobile device such as device 35. The STPs 30, 31 are coupled to home location registers (38, 39). These HLRs store information related to mobile stations whose home region is the region serviced by these STPs. An HLR keeps track of the location of a mobile station as it moves throughout the cellular network. For instance, if hand-held device 25 has a home region in Time Zone 1 and which is serviced by STPs 30, 31 then information regarding device 25 is maintained in HLRs 38 and 39. These HLRs would store information noting that the device 25 is presently being serviced by MSC 23.

In accordance with an embodiment of a message center configuration in accordance with the present invention a message sender could send a message to message center 1 or 2 over any of a number of communication networks. One exempliative network is shown as the public switch telephone network (PSTN) in FIG. 1. The message sender would send a message to the message center with an identifier of the intended recipient. The message center, via the STPs 30, 31 interrogates database(s) 40 to ascertain a mobile identification number (MIN) that corresponds to the recipient identifier received along with the message. An example of an entry in such a database is shown in FIG. 2 where a personal identification number (PIN) sent as a recipient identifier by the message sender is correlated with a mobile identification number (MIN). Once the MIN is known, the message center can interrogate another database to determine the HLR or home location register associated with that mobile station. This database is referred to as a global title translation database. An example of an entry in such a translation database is shown in FIG. 3. The message center then takes the HLR information and generates a query to the HLR servicing the intended recipient of the message. The HLR sends back information about the identity of the MSC with which the mobile station last registered and indicates the status of the registration that is, whether the subscriber is presently registered with that MSC. If the message center receives notification that the mobile station is presently registered with the MSC then the message center interrogates yet another database to correlate the identified servicing MSC with the time zone of the location in which that MSC is positioned. An example of an entry in such a database is illustrated in FIG. 4. Once the time zone of the MSC is determined, the message center then can translate the time at which it received the message in its own time zone to the time zone of the MSC which is presently serving the mobile station. This translation could be effected by knowing a time offset between the time zone of the message center and the time zone of the MSC with which the mobile station is registered. The message is then assembled and includes not only the message but a time-stamp which reflects the time that the message was received by the message center in terms of the time zone in which the intended recipient is located. An example of such a message is illustrated in

FIG. 5.

A flow chart illustrating an embodiment of a process for creating the message time-stamp is set forth in FIG. 6. This process is consistent with the operation described above and it is described below for sake of clarity.

A message center receives a message plus an intended recipient identifier which could be constituted by a personal identification number (PIN), step 601. The message center also notes the time it receives the message in relation to the time zone of the message center. The message center then translates the PIN to a MIN and hence to the home location register (HLR) of the intended recipient, (step 602). The message center then interrogates the home HLR to determine the MSC that was last registered as serving the intended recipient, step 603. If, however, the HLR indicates that the recipient is not presently registered then the message center simply stores the message and the received time and awaits registration notification, step 604. Once the HLR is notified by a servicing MSC that the recipient is registered, the HLR sends a registration notification to the message center and then the message center proceeds to process the information just as if the recipient had been registered at the time the message center received the message. Thus, it proceeds to step 605 where the message center takes the information about the location of the servicing MSC and detects the time zone of that MSC. The message center then translates the received time to the time zone of the servicing MSC, step 606. Finally, the message is transmitted to the intended recipient.

The present invention therefore provides the intended recipient with a more useful indication of the time that the message was received. It notes the time that the message was received and determines how to translate that time to reflect the movement of the cellular subscriber receiving the message. This avoids the confusion which might arise in other attempts to implement the IS-136 standard.

While the present invention is described in connection with a mobile communications configuration, it is equally applicable to those messaging services where a message center or central depository of messages is likely to be in a time zone different than a substantial number of intended message recipients. The message center could keep a database identifying the locations of the intended recipients and would then translate a time-stamp that reflects information about the time zone in which the intended recipient is located.

Claims

55 1. A method for time-stamping a message to a mobile recipient, the method comprising the steps of:

receiving a message at a message center, the

message intended for receipt by a given recipient;

detecting a location of the given recipient;

determining a time zone associated with a detected location of the recipient; and

creating a time-stamp for said message using said determined time zone.

2. The method of claim 1 comprising the further step of transmitting said message with said time-stamp from said message center to the recipient.

3. A method for time stamping a message to a mobile station, the method comprising the steps of:

receiving a message for the mobile station at a message center;

associating a first time with said message, said first time related to the time of receipt of the message by the message center;

determining if the mobile station is registered, and

if the mobile station is registered,

detecting a location of the mobile station;

determining a time zone associated with a detected location of the mobile station; and

creating a time-stamp that is associated with said message using said first time and said determined time zone.

4. The method of claim 3 wherein if it is determined the mobile station is not registered, storing the received message and the first time until such time as the mobile station registers, and then

determining a location of the mobile station,

determining a time zone of the mobile station and;

creating a time-stamp that is associated with said message using said first time and said determined time zone.

5. In a wireless communication system, a method for time stamping a message to a mobile station, the method comprising the steps of:

receiving a message for a mobile station at a message center at a first time;

interrogating a home location register (HLR) of said mobile station to determine if the mobile station is registered in the wireless communication system;

if said mobile station is registered, receiving from the HLR information identifying a mobile switching center through which the mobile station is registered;

determining a time off-set between the mes-

5 sage center and the identified mobile switching center; and

creating a time-stamp to be associated with said message using said first time and said time off-set.

6. The method of claim 5 wherein if said mobile station is determined to not be registered then, storing the message and first time wherein the first time constitutes an initial approximation of a time stamp, said initial approximation subject to change upon receipt of mobile station location information upon subsequent registration by said mobile station.

10 7. A method for sending a time-stamped message to a mobile recipient, the method comprising the steps of:

receiving a message at a message center in a first time zone;

determining a second time zone in which the mobile recipient is located;

creating a time-stamp based on said second time zone; and

sending said time-stamp and said message to the mobile recipient.

20 8. The method of claim 7 wherein said first and second time zones are different.

9. The method of claim 7 wherein said step of determining said second time zone comprises the step of:

determining a network node with which the mobile recipient is registered.

30 10. The method of claim 9 wherein said network switch comprises a switch providing wireless communication capabilities.

35 11. A system for time stamping a message to a mobile recipient comprising:

a home location register (HLR) that holds information about where the mobile recipient is registered;

a message center that receives a message for the mobile recipient and queries the HLR for an indication of a location of the mobile recipient; and

a time zone database identifying a time zone for the indicated location of the mobile location; wherein said message center time stamps said received message using time zone information identified by said time zone database.

40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130 135 140 145 150 155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240 245 250 255 260 265 270 275 280 285 290 295 300 305 310 315 320 325 330 335 340 345 350 355 360 365 370 375 380 385 390 395 400 405 410 415 420 425 430 435 440 445 450 455 460 465 470 475 480 485 490 495 500 505 510 515 520 525 530 535 540 545 550 555 560 565 570 575 580 585 590 595 600 605 610 615 620 625 630 635 640 645 650 655 660 665 670 675 680 685 690 695 700 705 710 715 720 725 730 735 740 745 750 755 760 765 770 775 780 785 790 795 800 805 810 815 820 825 830 835 840 845 850 855 860 865 870 875 880 885 890 895 900 905 910 915 920 925 930 935 940 945 950 955 960 965 970 975 980 985 990 995 1000 1005 1010 1015 1020 1025 1030 1035 1040 1045 1050 1055 1060 1065 1070 1075 1080 1085 1090 1095 1100 1105 1110 1115 1120 1125 1130 1135 1140 1145 1150 1155 1160 1165 1170 1175 1180 1185 1190 1195 1200 1205 1210 1215 1220 1225 1230 1235 1240 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3245 3250 3255 3260 3265 3270 3275 3280 3285 3290 3295 3300 3305 3310 3315 3320 3325 3330 3335 3340 3345 3350 3355 3360 3365 3370 3375 3380 3385 3390 3395 3400 3405 3410 3415 3420 3425 3430 3435 3440 3445 3450 3455 3460 3465 3470 3475 3480 3485 3490 3495 3500 3505 3510 3515 3520 3525 3530 3535 3540 3545 3550 3555 3560 3565 3570 3575 3580 3585 3590 3595 3600 3605 3610 3615 3620 3625 3630 3635 3640 3645 3650 3655 3660 3665 3670 3675 3680 3685 3690 3695 3700 3705 3710 3715 3720 3725 3730 3735 3740 3745 3750 3755 3760 3765 3770 3775 3780 3785 3790 3795 3800 3805 3810 3815 3820 3825 3830 3835 3840 3845 3850 3855 3860 3865 3870 3875 3880 3885 3890 3895 3900 3905 3910 3915 3920 3925 3930 3935 3940 3945 3950 3955 3960 3965 3970 3975 3980 3985 3990 3995 4000 4005 4010 4015 4020 4025 4030 4035 4040 4045 4050 4055 4060 4065 4070 4075 4080 4085 4090 4095 4100 4105 4110 4115 4120 4125 4130 4135 4140 4145 4150 4155 4160 4165 4170 4175 4180 4185 4190 4195 4200 4205 4210 4215 4220 4225 4230 4235 4240 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7245 7250 7255 7260 7265 7270 7275 7280 7285 7290 7295 7300 7305 7310 7315 7320 7325 7330 7335 7340 7345 7350 7355 7360 7365 7370 7375 7380 7385 7390 7395 7400 7405 7410 7415 7420 7425 7430 7435 7440 7445 7450 7455 7460 7465 7470 7475 7480 7485 7490 7495 7500 7505 7510 7515 7520 7525 7530 7535 7540 7545 7550 7555 7560 7565 7570 7575 7580 7585 7590 7595 7600 7605 7610 7615 7620 7625 7630 7635 7640 7645 7650 7655 7660 7665 7670 7675 7680 7685 7690 7695 7700 7705 7710 7715 7720 7725 7730 7735 7740 7745 7750 7755 7760 7765 7770 7775 7780 7785 7790 7795 7800 7805 7810 7815 7820 7825 7830 7835 7840 7845 7850 7855 7860 7865 7870 7875 7880 7885 7890 7895 7900 7905 7910 7915 7920 7925 7930 7935 7940 7945 7950 7955 7960 7965 7970 7975 7980 7985 7990 7995 8000 8005 8010 8015 8020 8025 8030 8035 8040 8045 8050 8055 8060 8065 8070 8075 8080 8085 8090 8095 8100 8105 8110 8115 8120 8125 8130 8135 8140 8145 8150 8155 8160 8165 8170 8175 8180 8185 8190 8195 8200 8205 8210 8215 8220 8225 8230 8235 8240 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10205 10210 10215 10220 10225 10230 10235 10240 10245 10250 10255 10260 10265 10270 10275 10280 10285 10290 10295 10300 10305 10310 10315 10320 10325 10330 10335 10340 10345 10350 10355 10360 10365 10370 10375 10380 10385 10390 10395 10400 10405 10410 10415 10420 10425 10430 10435 10440 10445 10450 10455 10460 10465 10470 10475 10480 10485 10490 10495 10

bile station is registered.

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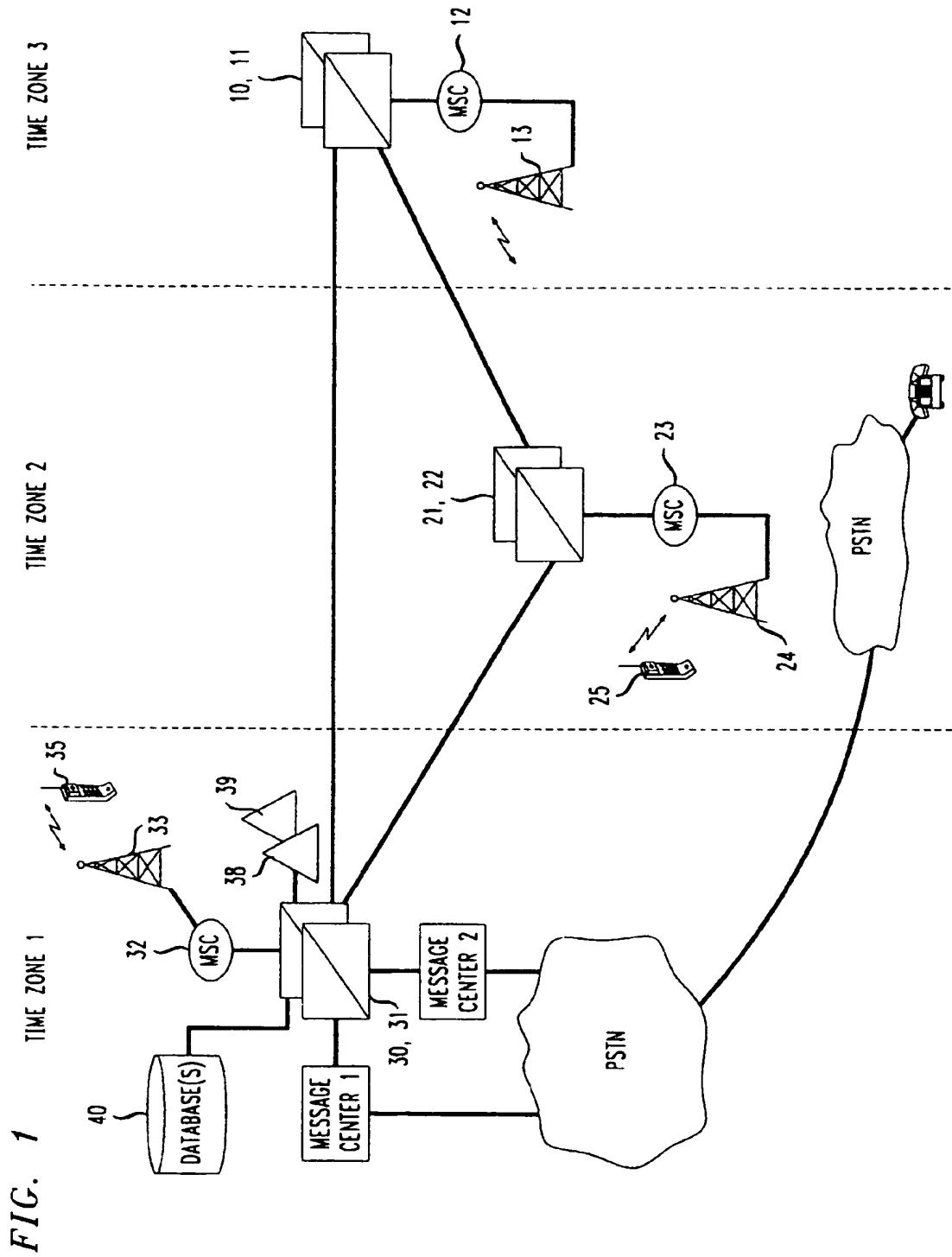


FIG. 2

PIN	MIN
ABCDEF	XXX XXX XXXX
:	:

FIG. 3

NPA-NXX	HLR
:	:

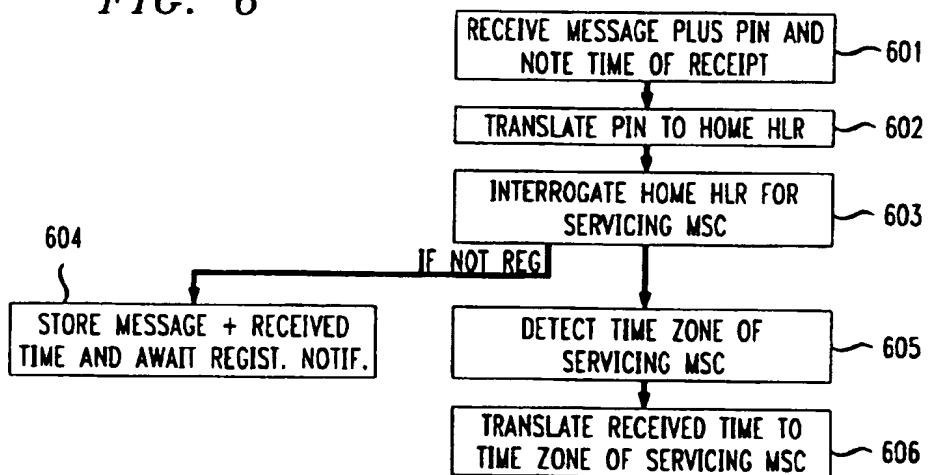
FIG. 4

MSC	TIME ZONE
:	:

FIG. 5

MESSAGE	
TIMESTAMP	ZONE
:	:

FIG. 6



(19)



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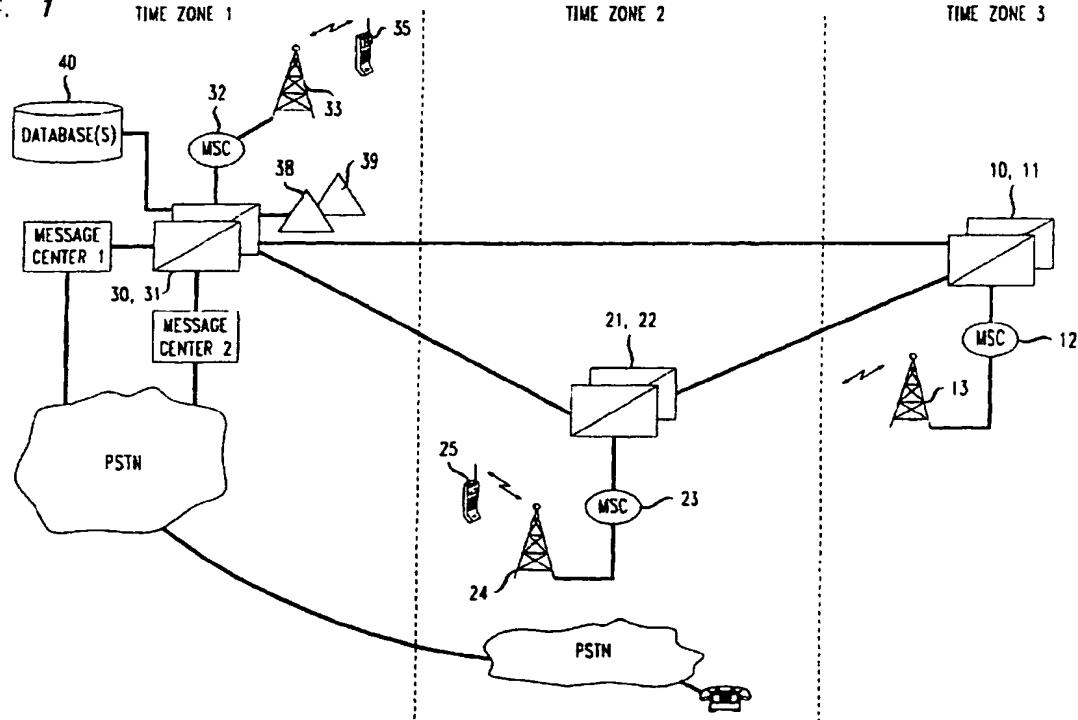
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(54) A method for time-stamping a message based on a recipient location

(57) A method time-stamps an electronic message
in accordance with information about the time zone in

which the intended recipient resides where the message
is originally received by a message center in a time zone
different from the intended recipient.

FIG. 1



EP 0 883 314 A3



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 98 30 4082

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
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		CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
		TECHNICAL FIELDS SEARCHED (Int.Cl.6)
		H04Q H04M
<p>The present search report has been drawn up for all claims</p>		
Place of search	Date of completion of the search	Examiner
THE HAGUE	22 March 1999	Dionisi, M
CATEGORY OF CITED DOCUMENTS		
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		
T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document		

ANNEX TO THE EUROPEAN SEARCH REPORT
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82